Technical Memorandum

To: Marjorie Blaine, U.S. Army Corps of Engineers

From: Elizabeth Goldmann and Robert Leidy, U.S. EPA, Region IX

Date: February 25, 2014

Re: Analysis of the *Rosemont Copper Project HMMP Implementation Plan Summary Corps File No. SPL-2008-00816-MB*

EPA is providing you with an initial narrative analysis and attached mitigation table for the *Rosemont Copper Project HMMP Implementation Plan Summary Corps File No. SPL-2008-00816-MB* (Summary). This Summary includes the following mitigation components: 1) Sonoita Creek Ranch; 2) Fullerton Ranch; 3) Davidson Canyon Parcels; and 4) Discharge of base flow at Pantano Dam. Based on our review of the Summary, we reaffirm our position that the mitigation as currently proposed is insufficient to offset project impacts and therefore, avoid a finding of significant degradation of the aquatic ecosystem.

Sonoita Creek Ranch

Sonoita Creek

- **Sonoita Creek Ranch is not in the same watershed as the mine impacts and consequently does not offset any of the pervasive damage to aquatic resources in the Cienega Creek watershed.**
  - Sonoita Creek Ranch lies outside the watershed where the RM project impacts will occur and therefore, mitigation proposed at the ranch will not offset any direct or indirect impacts to aquatic resources within the Cienega Creek watershed. This is a serious flaw in the design of the mitigation. The Cienega Creek watershed supports one of the most exceptional and unimpaired aquatic ecosystems remaining in the American Southwest; as a result of the project this watershed will experience significant unmitigated impacts to its aquatic environment.

- **There is relatively high risk and uncertainty associated with the proposed HMMP.**
  - The proposed mitigation is permittee responsible, will require significant hydrologic modifications (*i.e.*, high-flow bypass and constructed channels), structures requiring long-term maintenance (*i.e.*, weirs, diversions, outlet structures, levees and bank stabilization), planned vegetation maintenance (*i.e.*, land clearing,), and shallow, buried structures (*i.e.,* rip rap, fabric liners).

- **The proposed constructed channels are not designed as self-sustaining, unconstrained, or naturally functioning floodplain channels and so they will not provide significant and lasting ecological benefits to the aquatic ecosystem.**
  - Modeled predictions of the frequency of storm flows entering the constructed channel may be exaggerated putting the ecological benefits of the proposed constructed channel into question. Peak storm flows developed through a hydrologic analysis were input into a hydraulic HEC-RAS model. Flows of greater than 1,500 cfs in Sonoita Creek are predicted to spill overbank and enter the secondary channel and hence the constructed channel between the 2-year, 24-hour and 5-year, 24-hour storm events. However, analysis of readily available aerial photography indicates

that the existing secondary channel has not carried overflow from Sonoita Creek since the early-to-mid 1990s suggesting that modeled predictions do not accurately reflect current rainfall and stream discharge patterns within the Sonoita Creek watershed. Directly impacted drainages at the mine site typically carry flows and provide important hydrologic, physical and ecological functions annually during the monsoon season. As designed, it is doubtful that the proposed constructed channel at Sonoita Creek Ranch will flow at a frequency sufficient to offset many of the stream functions directly and indirectly lost at the proposed mine site.

- The proposed constructed channel will function more as a flood control channel than a natural, passive and self-sustaining floodplain ecosystem. The proposed constructed channel will require the placement of a buried filter and an unknown gradation and amount of rock riprap bank protection. Presumably, the armoring of all or a portion of the constructed channel is necessary to prevent or constrain lateral channel migration on the floodplain. High-functioning, natural floodplain channels are characterized by unrestricted lateral movement in response to high flows, thereby maximizing floodplain functions and the diversity and amount of valuable self-sustaining aquatic and riparian habitats. Constraining the movement of the proposed constructed channel will limit its ecological benefits to the aquatic environment and its value as mitigation for the project's loss of aquatic habitats. The constructed channel may also require frequent maintenance and therefore may not be considered self-sustaining or passive mitigation. Constraining the channel may result in scour and incision with the loss of function, not unlike what historically occurred on Sonoita Creek.

- There is no evidence that there will be sufficient overflow from Pond 2 to provide and sustain aquatic and riparian habitat along the 2,400 feet of the Constructed Overflow Channel. Sonoita Creek Ranch floodplain alluvium typically classified as Pima or Grabe-Comoro complex soils that consist primarily of sandy or silty loam which are well-drained, and do not pond water. As such, surface water percolates rapidly into the soil.

- There may be serious logistical constraints at crossings of the El Paso gas pipeline that will preclude implementation of a sustainable, functioning, passive channel design.

<u>Restoration (Reestablishment) of Ephemeral Channels and Riparian Habitat (pp. 2-3 of *HMMP Implementation Plan Summary*)</u>

- **Mitigation acreage for several of the constructed channels appears to be overestimated.**
- The HMMP states that the constructed ephemeral channel through the agricultural field will comprise approximately 21 acres of waters of the U.S. **The actual acreage appears to be 15.45 acres.** Sheet 1 of the HMMP depicts the length of the constructed channel through the agricultural field as 12,464 feet. Multiplying 12,464 x 54.0 feet (width of channel at 3 ft. depth) = 673,056 ft^2 (15.45 acres).

- The HMMP states that two secondary channels will be restored (reestablished) for a total of 5.2 acres. **The actual acreage appears to be 5.02 acres.** Sheet 2 of the HMMP depicts the length of the Constructed Overflow Channel and Constructed Secondary Channel 1 as 4,384 feet and

Constructed Secondary Channel 2 as 1,872 feet, for a total of 6,256 feet) Multiplying 6,256 feet x 35.0 feet (width of secondary channel at 2.5 ft. depth) = 218,960 ft^2 (5.02 acres).

- **There is little, if any, ecological benefit to the aquatic environment by connecting the three tributary channels to Constructed Secondary Channel 1.**

- The HMMP states that three tributary channels, totaling 2.2 acres, will be restored (reestablishment) to collect flows from three small canyons east of the agricultural field and convey these flows to one of the secondary channels. It is unclear from the HMMP whether the 2.2 acres of channel reestablishment includes only the new area of constructed channel from where the current ordinary high water mark (OHWM) ends at the constructed secondary channel to which they will now become tributary, or whether it includes all of the area of the three tributaries. The three tributaries have very narrow existing channels below the OHWM and it seems unlikely that the newly constructed channel segments would by themselves total 2.2 acres. In addition, review of readily available aerial photography indicates that these drainages, with very small watersheds and total surface flow volumes, ever historically connected through bed and bank channels to Sonoita Creek. Rather, the aerial photography indicates that surface flows quickly sink into the floodplain soon after exiting their canyon mouths and evidence of an OHWM disappears. Therefore, the natural condition for these small tributaries is to not connect direct with Sonoita Creek, but rather their waters would sink into the floodplain and reach Sonoita Creek through shallow subsurface groundwater pathways. We do not believe it is appropriate to receive restoration credit by creating stream channels where none likely existed historically and where the functional lift of creating stream channels is questionable at best.

- **Modification of the existing natural secondary channel is an impact to the aquatic environment and should not be included as mitigation acreage.**

- The impacted area of the existing secondary channel that will be "restored" that connects to Sonoita Creek and will convey flows to the constructed channel through the agricultural field totals 1.52 acres (1,227 linear feet x a width of 54 feet = 66,258 ft^2). This is an existing braid of Sonoita Creek that presumably will be impacted as part of the construction of the proposed ephemeral channel through the agricultural field. As such, the secondary channel cannot be used as mitigation for RM as it is an impact to existing waters from construction of the mitigation plan.

- **The proposed mitigation for the 10 acres of existing ephemeral channels should be considered primarily rehabilitation (enhancement), not reestablishment.**

- The HMMP states that approximately 10 acres of existing ephemeral features (presumably those aquatic areas that are located down gradient from the agricultural field) will be restored by directing flows in the constructed channels through these features. The HMMP further notes that these features currently receive flows from localized sheetflow and therefore do not currently exhibit an OHWM. We believe that these ephemeral features are aquatic habitats

regardless of the source of water or whether they exhibit an OHWM. The proposed channels will likely impact these existing ephemeral waters. Also, some of these features are seasonal ponds that likely function as important water sources for wildlife. Therefore, directing flows in constructed channels through these existing aquatic features should be considered as a rehabilitation (enhancement) measure, not reestablishment. In addition, Sheet 1 of the HMMP proposes to connect the ephemeral features to the primary constructed channel at its upstream and downstream ends. It is unclear from the HMMP whether the ephemeral features will receive flows only when flows exceed the capacity of the primary constructed channel and spill into the ephemeral channel, or that a culvert at some currently unknown elevation will connect the primary constructed channel and ephemeral channel at lower flows. If only flows that exceed the constructed channel's capacity reach the ephemeral channels, then these features will likely only infrequently become wetted. If a culvert will connect these features at lower flows, then constant maintenance will be required to keep the culverts open and functioning under fluvial conditions characterized by potentially high rates of sediment transport. Similarly, it is not clear how the proposed ephemeral features will reconnect with the primary constructed channel at their downstream confluence.

- **Rosemont cannot receive *reestablishment* credit of 105 acres upland xeroriparian buffer habitat. Rather, this proposed mitigation should be assessed as rehabilitation/preservation. In addition, this acreage should be weighed against the xeroriparian habitat impacted at the mine site.**

- The HMMP states that 105 acres of xeroriparian buffer habitat will be restored (resstablished) by recontouring fields and reseeding with native grasses and forbs. According to the Mitigation Rule, re-establishment means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions. Rosemont is inappropriately seeking to gain reestablishment credit for upland xeroriparian buffer habitat. The 105 acres of upland buffer can only be assessed for potential rehabilitation/preservation credit.

- In addition, no consideration has been given for the 1,252 of xeroriparian habitat that will be impacted by the proposed mine. Not including the impacts to xeroriparian at the mine site in the context of the proposed mitigation allows for an inequitable or unbalanced application of mitigation credits.

<u>Restoration (Rehabilitation) of Onsite waters of the U.S. (p. 2 of *HMMP Implementation Plan Summary*)</u>

- **Rosemont should not receive any rehabilitation credit for flow reduction in Sonoita Creek.**

- The HMMP states that approximately 13 acres of existing Sonoita Creek will be restored (rehabilitated) by diverting high flows into the proposed constructed channels and thereby "normalizing" flows in Sonoita Creek. There is no evidence that diverting some portion of the

total storm flows in excess of 1,500 cfs from Sonoita Creek into the constructed channel will "normalize" flows or restore functions in Sonoita Creek. High storm flows can be expected to continue in Sonoita Creek even with the addition of the constructed channel, especially during very large storms. These is no evidence presented that Sonoita Creek is currently experiencing ongoing incision or that bypassing some flows in excess of 1,500 cfs will result in channel sediment deposition, increased recruitment of riparian species, or appreciably lower velocities in the absence of concurrent physical restoration of the main Sonoita Creek channel. Restoration of incised channels in the Arid West typically requires some physical manipulation of the incised channel and it's floodplain in order to appreciably restore habitat and functions. In fact, it is possible that in the absence of pre-project flow and scouring monitoring that removing flows from the mainstem of Sonoita Creek could have unforeseen negative consequences.

- The HMMP states that 12 acres of existing water of the U.S. will be rehabilitated by virtue of removing all livestock grazing from the parcel. While removal of livestock grazing will likely result in some enhancement of existing waters, the amount of improvement to various functions has not been quantified through any defensible grazing study.

Enhancement of Ponds (p. 3 of *HMMP Implementation Plan Summary*)

- **No 404 mitigation credit should be given for the 6 acres of enhanced ponds.**
- The HMMP proposed enhancement of two ponds and the connecting channel totaling 6 acres. This proposed mitigation is a requirement of the USFWS Biological Opinion and should not be counted as 404 mitigation.

Restoration (Rehabilitation) of Riparian and Upland Habitat (p. 3 of *HMMP Implementation Plan Summary*)

- **Mitigation credit can only be given for rehabilitation of aquatic resources, not upland habitat. Mitigation credit for riparian and upland habitat would be considered as preservation only if it is essential to the functioning of the aquatic resources.** The HMMP states that the construction of ephemeral channels will rehabilitate 53 acres of sacaton-dominated riparian floodplain buffer habitat south of the agricultural field by directing larger storms through the area. Another 268 acres of riparian buffer habitat will be restored by removing livestock grazing from the parcel. In addition, approximately 705 acres of non-riparian upland buffer habitat will be rehabilitated by removing all livestock grazing. Mitigation credit can only be given for rehabilitation of aquatic resources, not upland habitat. For purposes of mitigation, non-aquatic resources can only be used as compensatory mitigation for impacts to aquatic resources when those resources are *essential* to maintaining the ecological viability of adjoining aquatic resources. Essential in this mitigation context implies that the any preserved uplands *absolutely necessary* to sustain aquatic resource functions in a watershed. The HMMP presents no quantitative analysis of current grazing practices and their relationship to the existing the functional condition of aquatic resources on the mitigation sites for purposes of determining preservation credits. Overgrazed aquatic resources can benefit from cessation of grazing, but most of any benefits to

the aquatic environment can be realized by removing grazing from the immediate stream and riparian zone.

- It is ecologically inequitable that Rosemont is seeking to gain rehabilitation credit for 1026 acres of various upland habitats for the direct fill of 40 acres of ephemeral waters at the mine site, without any consideration of the 4074 acres of upland buffer habitat that will be impacted by the proposed mine. Not including the impacts to upland buffer at the mine site in the context of the proposed mitigation allows for an inequitable or unbalanced application of mitigation credits. Furthermore, if Rosemont is requesting mitigation credit for the ecological benefits of other upland habitats to the functioning of aquatic habitats at Sonoita Creek Ranch, then the ecological benefits of upland habitats to the directly impacted waters at the mine site must also be weighed when assessing the adequacy of the proposed mitigation plan.

Monkey Springs

- **Temporal losses due to approvals from ADWR could be significant.**
  -Rosemont has acquired option rights on the Sonoita Creek Ranch. Upon ownership, Rosemont will have a 75% water allocation from Monkey Springs in the amount of 579 afa.
  - Given natural drought and climate change, it is uncertain whether Monkey Springs currently produces the full allocation as described in the Certificate of Water Right from ADWR. A certified water engineer should measure flow in order to ensure the amount of water available for mitigation purposes.
  - The Certificate of Water Right identifies the locations of the place of beneficial use of this water. A sever and transfer will be necessary if ADWR determines the proposed project places the water at a different location on the property. A sever and transfer approval by ADWR would first require approval of the irrigation district, agricultural improvement district or water user's association. Sever and transfer processes may take several years, especially if any parties protest the action. A recent sever and transfer took 11 years, two others are pending at 9 and 12 years.
  - The water rights are designated for irrigation and stock. Utilization of the water for ESA purposes in the ponds would likely constitute a change in beneficial use. Additionally, constructed channels through agricultural fields may not be considered irrigation and may also constitute a change in beneficial use. If so, a "Change In Beneficial Use" application would need to be filed with the ADWR.

- Given natural drought, climate change, and potential future mining in the watershed, it is questionable whether these flows are sustainable given future mining proposals in the area. There are anecdotal accounts of local wells drying in the area in response to drier climatic conditions.

Fullerton Ranch

Restoration (Rehabilitation) of Waters of the U.S. and Riparian and Upland Buffer Habitat (p. 4 of *HMMP Implementation Plan Summary*)

- **Fullerton Ranch is not in the same watershed as the mine impacts and consequently does not offset any of the pervasive damage to aquatic resources in the Cienega Creek watershed.**

- Fullerton Ranch lies outside the watershed where the RM project impacts will occur and therefore, will mitigation proposed at the ranch will not offset any direct or indirect impacts to aquatic resources within the Cienega Creek watershed. This is a serious flaw in the design of the mitigation. The Cienega Creek watershed supports one of the most exceptional and unimpaired aquatic ecosystems remaining in the American Southwest; as a result of the project it will experience significant unmitigated impacts to its aquatic environment.

- **There is no analysis regarding the functional condition of the property.**
  -Without an analysis of the functional condition of the aquatic and upland resources on the ranch, it is not possible to determine the functional gain (rehabilitation) from removing grazing from the ranch.
  -Based on a review of surrounding land use, there is no threat of destruction or additional adverse modification to aquatic resources beyond its current grazing use.
  - Fullerton Ranch does not protect all the headwater streams within Altar Valley. Therefore, any activities conducted on streams upstream of Fullerton Ranch could adversely affect the aquatic resources on the ranch.

- **Mitigation credit can only be given for rehabilitation of aquatic resources, not upland habitat. Mitigation credit for riparian and upland habitat would be considered as preservation only if it is essential to the functioning of the aquatic resources.** The HMMP states that Rosemont will fence the entire parcel and exclude any livestock grazing resulting in the rehabilitation of 51 acres of waters of the U.S., 249 acres of riparian buffer habitat and 1,463 acres of upland buffer habitat. Mitigation credit can only be given for rehabilitation of aquatic resources, not upland habitat. For purposes of mitigation, non-aquatic resources can only be used as compensatory mitigation for impacts to aquatic resources when those resources are *essential* to maintaining the ecological viability of adjoining aquatic resources. Essential in this mitigation context implies that the any preserved uplands *absolutely necessary* to sustain aquatic resource functions in a watershed. The HMMP presents no quantitative analysis of current grazing practices and their relationship to the existing the functional condition of aquatic resources on the mitigation sites for purposes of determining preservation credits. Overgrazed aquatic resources can benefit from cessation of grazing, but most benefits to the aquatic environment can be realized by removing grazing from the immediate stream and riparian zone.

- It is ecologically inequitable that Rosemont is seeking to gain rehabilitation credit for 1612 acres of various upland habitats for the direct fill of 40.4 acres of ephemeral waters at the mine site, without first providing compensation for the 4074 acres of upland buffer habitat that will be

impacted by the proposed mine. Not including the impacts to upland buffer at the mine site in the context of the proposed mitigation allows for an unbalanced application of mitigation credits.

Pantano Wash – water rights

- **Surface flows released at Pantano Dam will not result in any significant rehabilitation of aquatic functions.**

  -Most of the released water would likely drain into the porous substrate and deep aquifer without providing functionally meaningful improvement in aquatic resource functions.

  -Release of surface flows downstream at Pantano Dam does nothing to replace the ecological functions indirectly impacted along 18 stream miles at Barrel and Davidson Canyons. Mitigation should replace the suite of functions typically provided by the affected aquatic resource.

- **Natural drought, climate change and mining will diminish flows**.
  -The plan states Rosemont will discharge an estimate 400 AFA of base flow into a managed underground storage facility below Pantano Dam. Recent USGS measurements of base flow indicate that the total available wet water at the Pantano Dam is only an average 360 AFA. It is well known that dependable surface flows, as measured by USGS, continue to diminish due to a variety of factors, including natural drought and climate change.
- **It is unclear whether proposed dedicated surface water rights will be senior water rights.**
  -Rosemont proposes a like volume of surface water rights will be dedicated to the discharge. It is unclear whether Rosemont is proposing the 1908 senior water right associated with the wet water, or whether other junior water rights would be dedicated to the discharge.
  -It is reasonable to assume that the establishment of a MUSF would necessitate monitoring wells at the site. Monitoring wells would require authorization from Pima County.
- **Questions remain regarding approval from ADWR for surface water rights purchased by Rosemont.**
- It is unclear whether the existing location of the water use will change, thereby necessitating a sever and transfer. In addition, changing from irrigation of the golf course to water release below Pantano Dam for other beneficial uses may require a change in the beneficial use designation. These actions as previously discussed may take several years and result in significant temporal impacts. In addition, this action may be challenged through a protest, so there is no guarantee of approval should a sever and transfer be required.

- **Stream flow calculations not consistent with FEIS.**
  -The values presented in the "Mitigation for Loss of Downstream Flow" figure used to calculate the replacement waters are not consistent with values in the FEIS, and do not acknowledge the irreversible degradation to aquatic resources occurring during the mine's operation.

Preservation of Davidson Canyon Parcels

- **The Davidson Canyon Parcels are not acceptable mitigation under §404 CWA.**
  -Davidson Canyon Parcels would be degraded from surface flow diversion and groundwater drawdown from the mine making them unsuitable as mitigation.

  -As stated in the 2008 Mitigation Rule, preservation of these parcels may only be considered when the resources to be preserved provide important physical, chemical, or biological functions for the watershed and contribute significantly to the ecological sustainability of the watershed (33 CFR 320.3(h)(1)(i)(ii)).

  -Preservation of the Davidson Canyon Parcels is not appropriate mitigation pursuant to the 2008 Mitigation Rule. These parcels are surrounded by USFS land and are not under threat of destruction or adverse modifications (33 CFR Part 332.3(h)(1)(h)(iv)).

  -The Final Environmental Impact Statement (FEIS) predicts a 30-40% reduction in average annual stormwater runoff during the life of the mine. Post-closure stormwater runoff volume is estimated at 17.2% (FEIS Chapter 3 Seeps Springs and Riparian Areas). The reduction in stormwater will degrade the aquatic resources on the Davidson Canyon Parcels making them unsuitable as mitigation.

  -In addition to reductions in stormwater flows, these parcels lie within the modeled 5' groundwater contour drawdown, and will be subject to degradation (FEIS Chapter 3, Seeps Springs and Riparian Areas). These parcels represent a potential secondary impact from the project itself and should be assessed and mitigated.